



This document includes the Cover, Introduction, Table of Contents, and Vessels Generating Hull Coating Leachate for the Draft EPA Report "Hull Coating Leachate Discharge Assessment Report" published in August 2003. The reference number is: EPA-842-D-06-002

# **DRAFT**

## **Discharge Assessment Report**

### **Hull Coating Leachate**

Cover Page, Introduction, Table of Contents, and Overview  
of Discharge Analyses

August 2003

**DRAFT**

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# **DISCHARGE ASSESSMENT REPORT**

## **Hull Coating Leachate**

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## LIST OF ACRONYMS

BCC	Bioaccumulative Contaminants of Concern
CFR	Code of Federal Regulations
ChAR	Characterization Analysis Report
CWA	Clean Water Act
DAR	Discharge Assessment Report
DoD	Department of Defense
EEA	Environmental Effects Analysis
EEAR	Environmental Effects Analysis Report
EPA	Environmental Protection Agency
FIAR	Feasibility Impact Analysis Report
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
HI	Hazard Index
HQ	Hazard Quotient
MPCD	Marine Pollution Control Device
MSC	Military Sealift Command
MSDS	Material Safety Data Sheets
NAVSEA	Naval Sea Systems Command
NRL	Naval Research Laboratory
TBT	Tributyltin
TPE	Toxic Pound Equivalent
UNDS	Uniform National Discharge Standards
UNDSMIS	Uniform National Discharge Standards Management Information System
USCG	United States Coast Guard
VOC	Volatile Organic Compounds
WQC	Water Quality Criteria

## 1 Introduction

Section 312 of the Federal Water Pollution Control Act [also known as the Clean Water Act (CWA)] requires that the Secretary of Defense and the Administrator of the U.S. Environmental Protection Agency (EPA) develop Uniform National Discharge Standards (UNDS) for “...discharges, other than sewage, incidental to normal operation of a vessel of the Armed Forces...” [CWA Section 312(n)(1)]. UNDS is being developed in three phases. The first phase determined which vessel discharges require control by marine pollution control devices (MPCDs). MPCDs can be equipment, alternative materials, or management practices. The second phase, which this report supports, characterizes each discharge and evaluates the environmental effects and feasibility of implementing MPCDs for each discharge that requires control. The final phase will determine the design, construction, installation, and use of the MPCDs.

Discharge Assessment Reports (DARs) are prepared for each discharge requiring control as listed in the Title 40 Part 1700 Code of Federal Regulations (CFR). A DAR is a summary of discharge-specific analyses conducted during the second phase of UNDS. The purpose of the DAR is to present key features of a discharge to allow the balancing of the seven statutory considerations to produce a performance standard. The seven considerations are:

- the nature of the discharge,
- the environmental effects of the discharge,
- the practicability of using the MPCD,
- the effect that installing or using the MPCD would have on the operation or the operational capability of the vessel,
- applicable U.S. law,
- applicable international standards, and
- the economic costs of installing and using the MPCD.

In Phase I, it was determined that the Hull Coating Leachate discharge requires control by an MPCD (40CFR§1700.4). The following is a list of technical documents prepared for the Hull Coating Leachate discharge, and the complete analysis of this discharge can be found among various documents cited throughout this summary:

- *Vessel Grouping and Representative Vessel Selection for Hull Coating Leachate Discharge* (EPA and Navy, 2003c);
- *Characterization Analysis Report: Hull Coating Leachate*, hereafter referred to as the *Hull Coating Leachate ChAR* (Navy and EPA, 2003a);
- *Feasibility Impact Analysis Report: Hull Coating Leachate*, hereafter referred to as the *Hull Coating Leachate FIAR* (Navy and EPA, 2003b);
- *Environmental Effects Analysis Report: Hull Coating Leachate*, hereafter referred to as the *Hull Coating Leachate EEAR* (Navy and EPA, 2003c);
- *Hull Coating Leachate MPCD Screen, MPCD Option Group: Advanced Antifouling Coatings* (EPA and Navy, 2002a);



- *Hull Coating Leachate MPCD Screen, MPCD Option Group: Establish a Maximum Allowable Copper Release Rate for Antifouling Coatings* (EPA and Navy, 2003a);
- *Hull Coating Leachate MPCD Screen, MPCD Option Group: Foul-Release Coatings* (EPA and Navy, 2003b); and
- *Hull Coating Leachate MPCD Screen, MPCD Option Group: Non-Coating Methodologies* (EPA and Navy, 2003d).

A review of applicable U.S. law and international standards and cost-effectiveness information that relates the results of environmental effects to feasibility analyses are also topics in this report.

### ***1.1 Hull Coating Leachate Definition***

In 40 CFR Part 1700, the Uniform National Discharge Standards (UNDS) for vessels of the Armed Forces defined hull coating leachate as "...constituents that leach, dissolve, ablate, or erode from the paint on the hull into the surrounding seawater." The Hull Coating Leachate discharge was determined to have the potential for adverse environmental effects largely because of the estimated copper loadings from hull coatings; and therefore, was considered for further action in the UNDS process (Navy and EPA, 1999).

A variety of underwater hull coating systems exist in the Armed Forces. Some vessels do not have coatings applied while others have coating systems consisting of base anticorrosive coats and antifouling topcoats as depicted in Figure 1-1. For the purpose of this analysis, only vessels with coatings to control fouling by marine organisms are included (i.e., antifouling and foul-release coatings). Marine fouling on a vessel is undesirable because it increases vessel drag, reduces ship speed, and increases fuel consumption.

**Figure 1-1. Typical Antifouling Paint System**

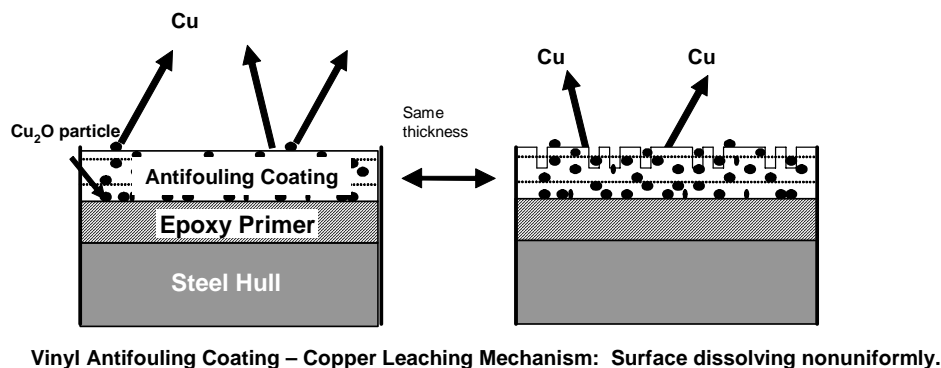
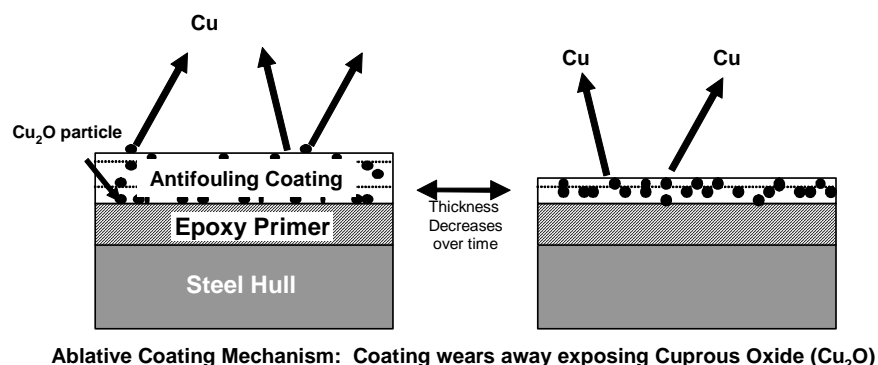


Each branch of the Armed Forces has a different process for procuring antifouling and anticorrosive coatings. The Navy requires that all coatings are tested and satisfy requirements described in MIL-PRF-24647, Performance Specification – Paint System, Anticorrosive and Antifouling, Ship Hull. The U.S. Coast Guard requires that all coatings meet the specifications of the U.S. Coast Guard Coatings and Color Manual. The Army, Military Sealift Command (MSC), and Air Force specify vessel coating requirements in their purchase orders.

Antifouling coatings typically contain biocides based on copper and zinc compounds that dissolve in water to prevent growth of marine biofouling organisms (e.g., barnacles, tube-worms,

algae, etc.) on hulls. Copper ablative coatings and vinyl antifouling coatings are the types of antifouling coatings predominately used by the Armed Forces. Vinyl antifouling coatings release copper that is exposed by leaching and hydrolyzing of rosin. Ablative coatings are designed to wear or ablate away as a result of water flow over a hull. Figure 1-2 illustrates the difference between the release mechanism of ablative and vinyl coatings. Foul-release coatings, typically based on silicone resins and oils, are also used on a few Armed Forces vessels to inhibit the adhesion of fouling organisms to the hull by creating a surface to which organism cannot easily adhere. However, while a vessel is pierside, organisms readily attach to the foul-release coated hull and are only dislodged after a vessel gets underway.

**Figure 1-2. Illustration of Ablative Coating and Vinyl Antifouling Coating Mechanisms**



## 1.2 Relevant U.S. Law and International Standards

This section describes relevant U.S. (including State and Tribal) law and International standards that pertain to the Hull Coating Leachate discharge. The UNDS regulatory development process was designed to consider the seven rulemaking considerations presented in Section 1.0. Two of the seven considerations for developing UNDS performance standards are U.S. law and International standards.

### **1.2.1 Relevant International Standards**

In 1999, the International Maritime Organization (IMO) adopted a resolution to address the use of organotin compounds in antifouling systems. According to an IMO publication, “the resolution called for a global prohibition on the application of organotin compounds which act as biocides in anti-fouling systems on ships by 1 January 2003, and a complete prohibition by 1 January 2008” (IMO, 2003). Ratification of this treaty instrument is pending.

International standards have not been developed for copper-containing antifouling paints. While they are not international standards, two countries, Canada and Sweden, have established maximum copper release rates for antifouling paints.

### **1.2.2 Relevant U.S. Law**

In 1988, the U.S. established a maximum allowable release rate of  $4 \mu\text{g}/\text{cm}^2/\text{day}$  for coatings containing tributyltin (TBT) or organotin compounds (33USC§2402). Antifouling coatings with organotin (i.e., TBT) compounds are no longer used on Armed Forces vessels. The last documented TBT-containing antifouling coating was removed from a Navy ship in 1994 (Ingle, 2002).

U.S. standards have not been developed for copper-containing antifouling paints. However, the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) (Public Law 95-396) requires the registration of antifouling biocides and antifouling coatings before the products can be marketed or sold.